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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/909,993	07/23/2001	Susan Davis Allen	FSU-0003	1378

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EXAMINER	
KORNAKOV, MICHAIL	
ART UNIT	**PAPER NUMBER**
1746	

DATE MAILED: 05/26/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/909,993	ALLEN, SUSAN DAVIS	
	Examiner	Art Unit	
	Michael Kornakov	1746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 March 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15,17-37 and 66* is/are pending in the application.

4a) Of the above claim(s) *4,5,7,12,13,19 and 21* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,6,8-11,14-18,20,22-37 and 66* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *1-15,17-37,66* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 03/08/2006 has been entered.

2. Claims 1, 33, 35-37, 66 are amended. Claims 1-15, 17-37, 66 are currently pending. Claims 4, 5, 7, 12, 13, 19, 21 are withdrawn as being directed to non-elected inventions. Claims 1-3, 6, 8-11, 14-18, 20, 22-37, 66 are examined on the merits.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 35, 36, 37 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The recited in claim 35 "obtaining the tailored optical pulse by adjusting optical pulse parameters comprising at least optical beam shape and/or size, and irradiation geometry" and in claims 36 and 37 "wherein the optical radiation pulse is tailored by adjusting optical radiation pulse parameters comprising at least optical beam shape and/or size, and irradiation geometry" constitutes an indefinite subject matter, because it is not clear whether the optical pulse is tailored by adjusting

at least optical beam shape and/or size, and irradiation geometry or optical pulse parameters are characterized by at least optical beam shape and/or size, and irradiation geometry. Clarification is required.

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

6. Claims 1-3, 6, 8-11, 14-18, 20, 22-37, 66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tam et al (J. Appl. Phys., Vol. 71, No. 7, 1 April 1992) in view of Boszormenyi et al (U.S. 6,394,105).

Tam teaches laser cleaning techniques, utilized in semiconductor industry for the removal of sub-micron size particles from semiconductor surfaces. The teaching of Tam includes selecting an optical radiation source, such as KrF or YAG lasers, having an optical energy distribution; determining a composition (water of alcohol or their mixture) with defined thickness (a few microns, page 3519, left column) and geometry (a film, page 3519, left column) to serve as an energy transfer medium for said optical radiation source having said optical energy distribution; determining an optical pulse of said optical radiation source, while employing the said energy transfer medium and irradiating particles deposited on the sample surface by transferring energy from the optical radiation source through the energy transfer medium, thus dislodging the particles from the surface. Regarding the recitation of the instant claims, concerning with "damage to the sample" and "damage threshold", it is noticed here that Tam indicates possible damage to the substrate and provides conditions to eliminate or minimize such damage. Regarding the limitation of claim 1, which is concerned with

selecting laser energy transfer parameters base on a composition of the particle(s) to be removed, Tam teaches that the laser affluence is chosen depending on the types of contaminants to be removed and on the substrate damage threshold (page 3522, summary).

Regarding the instant claim 6, Tam teaches pulse length and shape of the laser pulse at page 3518 under heading 1 and illustrated in figures 3 and 4.

As to the claim 3, which recites variety of parameters for characterizing the laser energy, since Tam utilizes irradiation by laser energy, the instantly recited laser energy parameters either explicitly or inherently present in the teaching of Tam. Thus, Fig. 3 of Tam shows the wavelength of pulsed laser energy with certain pulse repetition rate. The other instantly recited parameters, such as density of the laser energy, the pulse length and shape of the laser energy, the pulse repetition rate of the laser energy, the laser beam size and/or shape, and the irradiation geometry of the particle(s)l/substrate/energy transfer medium, are inherently present in the teaching of Tam, as parameters attributed to the description/characterization of laser energy. Figure 4 and relevant text indicate the use of a specific Moly Mask as the laser beam property controlling element. The temperature where the cleaning in Tam reference is performed is ambient.

As to claims 14, Tam discloses experimenting with different solvents in order to ascertain the best result. Figure 3 illustrates different coupling scenarios.

Regarding the limitation of the instant claim 37, which is concerned with absorbtion of radiation pulse largely by energy transfer medium, but not significantly by

the sample, Tam teaches the implementation of such cleaning technique in the abstract and by indicating the expectation that film-enhanced laser cleaning works the best when the laser wavelength is chosen for strongest absorption by the liquid film (page 3520). Regarding the specificities of claim 66 see also Fig.3 and page 3518 et seq.

Regarding the claim 17, the processing parameters of Tam, particularly the wavelength of the pulsed radiation, are selected based on a specific application (removal of sub-micron size particles from semiconductor surfaces) and implemented in a specific environment, wherein arrangement for liquid film enhanced pulsed laser cleaning equipment was accommodated.

With regard to the limitations reciting "wherein the predetermined removal threshold is greater than forces adhering the one or more particles to the surface and less than a damage threshold of the substrate", it is noted that such limitation is inherently and necessarily present in Tam, since the removal of the particles described by Tam is only possible when the adherent forces between the particles and the surface are overcome, which is only possible when the removal forces is greater than the forces of adherence of particles to the surface. In the event that one skilled in the art would not clearly envisage such, it would have been obvious to those skilled in the art that in order to remove the particle from the surface the forces of removal should be clearly greater than the forces of attraction between the particles to be removed and the surface in order to achieve such result.

Regarding the limitations of claims 28 and 29, Tam discloses depositing energy

transfer medium onto the substrate (page 3519), however remains silent about specificities of depositing equipment, as recited in the instant claims 28 and 29. It is noted here that claims 28 and 29 recite "the method". It has been held that to be entitled to weight in method claims, the recited structure limitations therein must affect the method in a manipulative sense, and not to amount to the mere claiming of a use of a particular structure, consult Ex parte Pfeiffer, 1962 C.D. 408 (1961).

While teaching the necessity of optimizing certain processing parameters (page 3522, E and F) Tam does not specifically select parameters of laser beam shape and irradiation geometry. However, selecting and optimizing such parameters are also known in the art. Thus, Boszormenyi teaches laser cleaning and removing contaminants on a surface of the substrate. Boszormenyi specifically indicates that for efficient cleaning of the surface the laser beam shape incident on the surface is modified. Boszormenyi also indicates that the geometry of the source is optimized to allow discrimination of particles. Therefore, one skilled in the art motivated by Boszormenyi would have found obvious to select and optimize parameters of laser beam shape and irradiation geometry in order to enhance removal of sub-micron size particles from semiconductor surfaces in the teaching of Tam.

Regarding the other limitations of the instant claims, such as selecting a composition, thickness and geometry of the energy transfer medium based on a composition of the particle(s) to be removed; determining an optical energy distribution of an optical radiation source based on the optical characteristics of a surface of a sample or particle(s) to be removed from the sample, Tam clearly motivates the skilled

artisan to implement such limitations by indicating that some degree of empirical optimization of the liquid type to be used for laser cleaning of various substrates with various types of particles (page 3522, F). Tam also motivates the skilled artisan to consider the optical characteristics of a sample or particle(s) by discussing the optical characteristics of a solid surface, being very absorbent or opaque. Therefore, one skilled in the art motivated by the teaching of Tam would have found obvious to select a composition, thickness and geometry of the energy transfer medium based on a composition of the particle(s) to be removed and determining an optical energy distribution of an optical radiation source based on the optical characteristics of a surface of a sample or particle(s) to be removed from the sample in order to optimize and provide efficient removal of sub-micron size particles from semiconductor surfaces in the teaching of Tam/ Boszormenyi.

Response to Arguments

7. Applicant's arguments with respect to claims 1-3, 6, 8-11, 14-18, 20, 22-37, 66 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Kornakov whose telephone number is (571) 272-1303. The examiner can normally be reached on 9:00am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on (571) 272-1414. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

M. Kornakov

Michael Kornakov
Primary Examiner
Art Unit 1746

05/23/2006